

Remarks

Claims 1 and 4-22 are pending in this application. Claims 2 and 3 have been cancelled, and claims 21 and 22 are new. Applicants have amended claims 1 and 4-20. The examiner has rejected claims 1-20 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 7,032,218 to Shirasawa et al. in view of U.S. Patent No. 6,907,504 to Burton et al.

A. Independent Claims 1, 9, 15, and 18

The Examiner has rejected independent claims 1, 9, 15, and 18 as being obvious over Shirasawa in view of Burton. Applicants contend that neither Shirasawa nor Burton, nor their combination, teaches or suggests all of the elements required by the independent claims.

The Examiner acknowledges that Shirasawa does not teach the step of updating the element (now amended to specify firmware) of the spare storage drive. (Office Action, p.2) Thus, Shirasawa alone does not teach all of the elements required by the independent claims. Additionally, it should be noted that the updating method of Shirasawa requires “a step for copying data recorded in a disk of a hard disk unit A, of which firmware is to be updated, to another hard disk unit B.” (Shirasawa, col.2:60-62) This is in direct contrast to the present invention, which does not require that the spare storage drive contain any data that is being stored or managed as part of the drive array before it functions as a member of the drive array. (Spec., p.7:24-27) For the method of Shirasawa to work, there must always be the step of copying the data from the disk to be updated to another disk. This takes valuable time that the present invention saves by not requiring the spare storage disk to contain a copy of the disk to be updated.

Independent claims 1, 9, 15, and 18, as amended, all require, at least in part, that the spare storage drive “functions as a drive of the fault tolerant drive array” and that a write to

the spare storage drive during the time it functions as a drive of the drive array causes a modification of data **in the spare storage drive**. Burton does not teach or suggest these required limitations. In Burton, commands to the drive to be updated are diverted. (Burton, col.3:22-25) The write policies are altered to access either a logging file (which contains data diverted from the primary disk drive during upgrading) or to a mirror disk, and if neither a logging file nor a mirror disk is available, Burton teaches that the write policy creates a parity code and writes this parity code to the parity drives. (Burton, col.3:29-35) None of these options constitutes a modification of data in a spare storage drive which functions as a drive of the fault tolerant array. The logging file of Burton is not a spare storage drive which “functions as a drive of the fault tolerant drive array,” as required by the independent claims. In fact, Burton states that while the disk drive to be updated is off-line, and the logging file comes into use, the RAID array is in a critical mode. (Burton, col.3:40-42) This is in direct contrast to the present invention, in which “a storage drive may be swapped in and out of a storage array for a firmware update step without compromising the function or data integrity of the remainder of the storage drives of the shared storage unit.” (Spec., p.10:3-6) Additionally, the mirror disk in Burton is not taught or suggested to be part of a RAID 5 storage system, which the present invention requires. (Burton, col.6:8-10) Finally, in the case where the write policy of Burton writes a parity code to the parity drives, the data is being written to parity drives and not the spare drive, and thus the write does not cause a modification of data **in the spare storage drive**, as required by the claims.

Neither Shirasawa nor Burton, nor their combination, teaches a spare drive with **updated firmware** that is swapped into a fault-tolerant drive array, which functions as a fully operational member of the drive array, and which is itself **modified as a result of write operations** (and in certain instances, read operations) directed to the drive. Additionally, no

copying of the contents from the drive to be updated to the spare drive is required by the present invention, in contrast to Shirasawa, and no disruption in the functioning of the RAID array is necessitated by the methods of the present invention, in contrast to Burton.

Applicants respectfully submit that the combination of Shirasawa and Burton does not teach or suggest all of the elements of the independent claims. As such, these claims are not obvious over Shirasawa in view of Burton. Applicants request that the rejection of independent claims 1, 9, 15, and 18 be withdrawn and that these claims be passed to issuance.


B. Dependent Claims 4-8, 10-14, 16-17, and 19-22

Dependent claims 4-8, 10-14, 16-17, and 19-22 will not be discussed individually as they depend from an otherwise allowable base claim.

Conclusion

Applicants respectfully submit that pending claims 1 and 4-22 are allowable and should be passed to issuance.

Respectfully submitted,



Roger Fulghum
Registration No. 39,678

Baker Botts L.L.P.
910 Louisiana St.
One Shell Plaza
Houston, Texas 77002-4995
(713) 229-1707

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